193

Progression of aortic valve stenosis is associated with bone remodeling and secondary hyperparathyroidism

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Background. There is currently no medical therapy that can prevent the progression of aortic valve stenosis (AS). Recent data highlight a possible relationship between bone metabolism and AS progression but prospective data are lacking.

Methods. Serum level of calcium, phosphorus, creatinine, vitamin D, intact parathormon (iPTH), C-terminal-telopeptide of type-1-collagen (CTX) and osteocalcin were assessed at baseline in 110 patients with at least mild AS. CTX/Osteocalcin ratio was calculated as a marker of bone remodeling balance. AS severity was assessed at baseline and 1 year based on mean gradient.

Results. AS progression was not associated with age, glomerular filtration rate, calcium and phosphorus levels, calcium-phosphorus product, but significantly with iPTH, CTX/Osteocalcin and vitamin D status (all p<0.01). There was no correlation between iPTH and CTX/Osteocalcin (R=0.04, p=0.70) and AS progression was associated with CTX/osteocalcin (R=0.42, p=0.009) but not with iPTH (R=0.10, p=0.55) in patients with normal vitamin D level (33%), whereas it was associated with iPTH (R=0.47, p<0.001) and not with CTX/osteocalcin (R=0.04, p=0.73) in those with low vitamin D levels, especially if mild renal insufficiency was present (R=0.61, p<0.001).

Conclusion. In the present study, we observed an association between AS progression, vitamin D, iPTH and CTX/Osteocalcin ratio and their respective weight was function of the vitamin D status. In patients with low vitamin D, AS progression was associated with iPTH and secondary hyperparathyroidism, especially if mild renal insufficiency was present whereas in patients with normal vitamin D, AS progression was associated to a bone resorptive balance. These findings may have important therapeutic implications.

194

Clinical outcome in asymptomatic severe aortic stenosis. Insights from the new proposed aortic stenosis grading classification

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Background: The management of patients with asymptomatic severe aortic valve stenosis (AS) remains controversial. Moreover, under the same denomination of severe AS, several entities may be identified according to transvalvular flow rates and pressure gradients, resulting in 4 flow-gradient patterns. We therefore studied the clinical course of patients with asymptomatic severe AS according to this new AS grading classification.

Methods and Results: Transthoracic echocardiography and measurement of BNP level from venous blood sample were performed in 150 consecutive patients with asymptomatic severe AS and normal exercise test. Patients were classified in 4 groups depending on LV flow state (normal flow ***vs.*** low flow: 35ml/m²) and pressure gradient levels (low gradient ***vs.*** high gradient: 40 mmHg). Patients with normal flow/low gradient (NF/LG) had significantly lower BNP than those with low flow/ high gradient (HG) and LF/LG. The mean follow-up was 27±12 months. At 2-year, cardiac event-free survival was 83±6%, 44±6%, 30±12% and 27±13% in NF/LG, NF/HG, LF/HG and LF/LG groups, respectively (p<0.0001). On multivariable analysis, LF/LG (HR=5.26, 95% CI: 2.04-14.3, p=0.045) and LF/HG (HR=2.38, 95% CI: 1.02-5.55, p=0.001) were identified as strong independent determinants of poor prognosis as compared to NF/HG. By limiting the multivariable analysis to patients with LF, LF/LG was an independent predictor of markedly reduced cardiac event-free survival when compared to LF/HG (HR=5.4, 95%CI: 1.03-28.6, p=0.046).

Conclusion: The use of the new AS grading classification integrating valve area and flow-gradient patterns allows a better characterization of the clinical outcome of patients with asymptomatic severe AS.

195

Low flow-low gradient aortic stenosis associated with left ventricular dyssynchrony: impact on contractile reserve, and effects of cardiac resynchronization therapy

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Background: In low flow-low gradient aortic stenosis (LF-LG AS), assessment of contractile reserve (CR) using dobutamine stress echocardiography (DSE) is recommended to predict post-operative outcome. The prevalence and influence of left bundle branch block (LBBB) in this population has never been studied.

Purpose: 1) to evaluate the influence of LBBB on CR at DSE in LF-LG AS. 2) to assess the effects of cardiac resynchronization therapy (CRT) in patients with LF-LG AS associated with LBBB, without CR.

Methods. 25 patients with LF-LG AS were consecutively enrolled. CR was defined by an increase in stroke volume >20% on dobutamine. Patients with LBBB and high EuroSCORE >20% were proposed either surgical aortic valve replacement (AVR), transcatheter valve implantation (TAVI), or CRT prior to AVR.

Results: Seventeen patients (68%) had LBBB. Compared to patients with narrow QRS, these patients were older (83 vs 67 years, p=0.003), more symptomatic (NYHA class 3.6 vs 2.5, p=0.002), had higher logistic EuroSCORE (26.8 vs 16.8%, p=0.02), lower mean aortic gradient (25 vs 36 mmHg, p = 0.03). CR was present in 46% of patients with LBBB, and 100% in those with narrow QRS (p=0.009). Among 17 patients with LBBB, 15 underwent CRT: all of them had significant improvement in NYHA class, EuroSCORE, LVEF, mean aortic gradient, and Nt-proBNP. Ten of 15 CRT patients underwent subsequent AVR (6 surgical, 4 TAVI) with uneventful post operative outcome in all except 1 (mesenteric infarction). Four CRT patients refused AVR, 2 are doing well, 2 worsened and died 2 years post-CRT. One patient died suddenly 10 days post-CRT.

Conclusion: LBBB is highly prevalent in patients with LF-LG AS and may account for most cases of absent CR. CRT induces improvement in LVEF in all patients, including those with no CR on DSE, and should be considered prior to AVR to improve the status of patients with very high operative risk. However, the risk of sudden death following CRT remains to be determined.

196

Changes in QRS duration during trans-catheter aortic valve implantation strongly predicts the risk of permanent pacing

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Purpose: Preventive pacing after TAVI (trans-catheter aortic valve implantation) exposes to the risk of severe complications, such as cardiac perforation. This can be avoided by limiting temporal lead placement in high risk patients. The purpose of this study is to identify clinical and electrical factors of permanent pacing.

Methods: The study included 35 patients (80±10 years, Euroscore=28.75±12%) free of permanent pacing before and immediately after TAVI procedure. Permanent pacemaker implantation was performed when complete atrioventricular block was observed at day 3 after TAVI procedure.

Prosthesis-annular length and QRS duration before and immediately after TAVI implantation were compared to the need of permanent pacing.

Results: The TAVI procedure was successfully performed in all and permanent pace maker implantation was required in 7 patients (20%) because of a complete AV block occurring during the 3 days after TAVI procedure. Patients requiring a permanent pacing had greater prosthesis-annular length (11±4 mm vs. 8±4 mm, p=0.03) and QRS duration after implantation (137±24 ms vs. 161±3 ms, p=0.006), while no difference was observed for baseline QRS duration. QRS enlargement correlated with prosthesis annular length (r=0.4, p=0.01). Interestingly, all patients with QRS enlargement <48 ms (n=20) were free of complete AV block, while permanent pacing was required in 54% (7/15) of patients with a QRS enlargement >48 ms (n=15).

Conclusions: In patients with a limited changes in QRS duration (<48 ms) after TAVI procedure, the risk of complete block seems limited, while QRS enlargement >48ms appears strongly associated to the need of permanent pacing.

197

Percutaneous mitral commisurotomy in patients aged 50 years and more

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Introduction: The studies concerning the percutaneous mitral commissurotomy (PMC) in the elderly patients are rare.

Objectives: The purpose of this work is the study of early ,mid and long-term results of the PMC in patients aged more than 50-years and their comparison with the results obtained in the younger patients.

Materials and methods: retrospective study of 170 patients, hospitalized in the cardiology department between January 1994 and January 2008 having PMC by balloon inoué with a clinical and echocardiographic follow-up of more than 10 years. We defined the patients >=50 years old (group1) and the patients aged less than 50-years (group 2)

Results: – 45 patients were >= 50 years old (17,05%). The mean age was 56,41%. 62,1% were in atrial fibrillation (AF) and 37,9% were in sinus rhythm(SR) . The WILKINS score showed that 20,7% had a score <8,72, 4% between 9-11 and 6,9% a score >12. After PMC the mean mitral area was passed from 1,07+–0,2 cm^2 to 2,03+–0,3 cm^2 (p<0,001), the transmitral gradient was passed from 14,88+–5,14 mmhg to 3,99+–2,26 (p<0,001) and the mean pulmonary artery pressure was passed from 35,66 +–9,97 mmhg to 24,34 +–9,48 mmhg (p<0,01). The estimation of Kaplan-Meier showed that the absence of restenosis was respectively 80,8%;73,1%; 65,4% and 61,5% in 3,5,7 and 10 years. – the Comparison between both groups of the young and the elderly patients showed that in the (group 2) the majority of patients were in SR (91,7%) however in the (group) the majority were in AF (61,7%). In our study, in the (group 2) there were no patients having a high score of WILKINS >11, however in the (group 1) 6,9% had a score of WILKINS >11. Finaly in the (group 2) the percentage of patients having had a restenosis is 14,3%; however in the (group1) restenosis was noted in 38,46%.

Conclusion: PMC is effective first therapy in patients aged >=50 years with symptomatic mitral stenosis.

198

Coronary revascularisation before transcatheter aortic valve implantation does not impact on outcome

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Objective: To assess the impact of coronary artery disease management on prognosis in patients undergoing transcatheter aortic valve implantation (TAVI).

Methods: 121 patients (53 men, 85±7 years) with severe symptomatic aortic stenosis (Aortic Valve Area [AVA]=0.7±0.2 cm^2, gradient=43±15 mmHg, LVEF=47±13%, logistic Euroscore 27±13%) underwent TAVI using Medtronic Corevalve® bioprosthesis. Coronary angiography was performed in all before the procedure. Significant coronary lesions (≥50%) were treated by angioplasty one month before the procedure or medically treated (aspirin, statin and betablocker). Revascularization strategy was left free to the clinician appreciation and compared to primary outcome (heart failure, myocardial infarction and mortality).

Results: Of the 121 patients, 57% exhibited significant coronary artery stenosis (45% monotroncular, 35% bitroncular and 20% tritroncular) with proximal coronary stenosis ≥70% in 73%. Revascularization was performed in 23 patients (78% with proximal stenosis ≥70%) and medical treatment in 38 patients (45% with proximal stenosis ≥70%). TAVI procedure was successfully performed in all patients with AVA and mean LVOT gradient after implantation averaging 2.0±0.4 cm^2 and 9±4 mmHg, respectively. Mean follow-up duration was 194±23 days. Primary outcome [heart failure (n=10), myocardial infarction (n=1) and mortality (n=27)] was similarly observed in the coronary angioplasty and medical treatment groups (26% vs. 32%; p=0.81). Interestingly, poor outcome was only associated to procedure duration (94±6 min vs. 72±6 min, p=0.015) and greater peak troponin I after procedure (0.98±0.2 vs. 0.24±0.1, p=0.0001). Furthermore, increase in troponin I after TAVI was observed in all patients after the procedure independently to the presence of significant coronary stenosis or to revascularization strategy.

Conclusion: Coronary artery revascularization before TAVI does not impact clearly on outcome. The association between peak troponin after procedure and prognosis suggests that an alternative strategy to better protect myocardial function should be investigated.

199

Evaluation of radiation dose during transcatheter aortic valve implantation: Comparison with coronary angiograms and percutaneous coronary interventions

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Background: Transcatheter aortic valve implantation (TAVI) is a growing cardiac intervention using ionising radiation with deterministic and stochastic effects for the patient as well as for the medical heart team. Dose area product (DAP) evaluates radiation dose and is easily found on the X-ray tube program at the end of the procedure. We aimed to measure the dose of radiation emitted during TAVI, and to compare with coronary angiogram (CA) or percutaneous coronary interventions (PCI).

Methods: We perform TAVI, CA and PCI in the same cath lab. We compare DAP as noted at the end of each procedure for these 3 types of intervention over the same period (September 2008 to June 2010). For TAVI, we also analysed the role of technical (femoral vs apical approach) and patient-related features (weight, body surface area).

Results: During the study period, we consecutively included 37 cases of TAVI, 1230 CA, 89 isolated PCI and 807 CA with *ad hoc* PCI. DAP was significantly higher in TAVI than in CA alone (83.3 vs 44.9 Gy.cm^2, p<0.01), but no significant difference was observed between TAVI and PCI and CA/PCI (respectively 70.1 and 90 Gy.cm^2). Among TAVI, there was a significant difference between transapical approach and transfemoral approach (80 vs 86.3 Gy.cm^2 respectively, p=0.05). DAP was also influenced by patient's weight (p <0.01, r^2=0.29) and body surface area (p<0.01, r^2=0.32).

Conclusion: The radiation dose related to TAVI is twice that of coronary angiogram, and similar to that of coronary angiogram with *ad hoc* PCI.